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| APPLICATION NUMBER | FILING DATE | FIRST NAMED APPLICANT | ATTORNEY DOCKET NO. |
|--------------------|-------------|-----------------------|---------------------|
|--------------------|-------------|-----------------------|---------------------|

08/788,898 01/23/97 GENOV

G GNMK2017CIP-

21M1/0616

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EXAMINER

SIRCUS, B

ART UNIT

PAPER NUMBER

2107

2

DATE MAILED: 06/16/97

 This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

OFFICE ACTION SUMMARY

- ☐ Responsive to communication(s) filed on _____
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 D.C. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

- ☒ Claim(s) 1-43 is/are pending in the application.
- Of the above, claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-43 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claims _____ are subject to restriction or election requirement.

Application Papers

- ☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- ☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
- ☐ received.
- ☐ received in Application No. (Series Code/Serial Number) _____
- ☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

- ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- ☒ Notice of Reference Cited, PTO-892 X 2
- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☐ Interview Summary, PTO-413
- ☒ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Notice of Informal Patent Application, PTO-152

-- SEE OFFICE ACTION ON THE FOLLOWING PAGES --

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1. Claims 2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2:

“smooh” is misspelled.

Claim 9:

the phrase “solving a direct kinematic problem at position level by” is narrative and should be removed from the claim.

Claim 35:

the use of “and/or” is indistinct. Since “one or more” is already used the “/or” should be removed.
(both instances).

Claim 43:

the use of “and/or” is indistinct. Suggested language is “one or more of a, b and c”.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 8, 10 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. (4,433,382) in view of Brien (5,604,677). Cunningham et al. discloses a two link and wrist robotic arm. Each movable joint has feedback to the controller and the wrist has three degrees of motion. Cunningham et al. does not disclose linear motion about the closest joint connection. Brien discloses a robot prealigner which is capable of performing x motion at the location of the link/base

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connection. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the controller of Cunningham et al. to provide linear motion at the base because Brien teaches that this motion allows the robot to reach an extended work area.

Claims 3-5, 11-13, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. in view of Brien and Maydan et al. (4,951,601). Cunningham et al. discloses a multiple linked robotic arm which may be modified according to the teachings of Brien to use linear base motions as discussed above but neither of these references disclose work stations which operate in conjunction with linear or conveyor processing systems. Maydan et al. discloses a wafer processing system that picks wafers from a loading area consisting of arrays of horizontally and vertically placed wafers. Since the tray holding wafers may move this is similar to a conveyor system. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the controller of Cunningham et al. to provide horizontally located items for the system to operate on because Maydan et al. teaches that this is an efficient method of providing the wafers to the processing system.

Claims 6, 14, 34 and 39-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. in view of Brien, Maydan et al. and Poduje et al. (5,456,561). Cunningham et al. discloses a multiple linked robotic arm which may be modified according to the teachings of Brien to use linear base motions and according to the teachings of Maydan et al. to provide wafers horizontally as discussed above but none of these references disclose sensing the wafer alignment and correcting the alignment as needed. Poduje et al. discloses a robot wafer alignment device that senses misalignments and corrects them. It would have been obvious to one of ordinary skill in the art at the time the invention was

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made to have further modified the controller of Cunningham et al. to provide wafer alignment because Poduje et al. teaches that this allows the wafer position to be corrected.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. in view of Brien, Maydan et al., Poduje et al. and Ueyama et al. (5,571,325). Cunningham et al. discloses a multiple linked robotic arm which may be modified according to the teachings of Brien to use linear base motions and according to the teachings of Maydan et al. to provide wafers horizontally and according to the teachings of Poduje et al. to provide wafer alignment when errors are detected as discussed above but none of these references disclose reversible end effector tools. Ueyama et al. discloses a reversible end effector tool. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the controller Cunningham et al. to provide a reversible end effector tool because Ueyama et al. teaches that this allows the end effector to grab and place wafers in one seek time thereby halving the wafer placement time.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. in view of Brien, Maydan et al., Poduje et al., Ueyama et al. and Miyake et al. (5,157,315). Cunningham et al. discloses a multiple linked robotic arm which may be modified according to the teachings of Brien to use linear base motions and according to the teachings of Maydan et al. to provide wafers horizontally and according to the teachings of Poduje et al. to provide wafer alignment when errors are detected and according to the teachings of Ueyama et al. to provide reversible tool end effectors as discussed above but none of these references disclose tracking the position of the end effector using kinematics. Miyake et al. discloses a robotic controller that controls the robotic arm using kinematics. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the controller of Cunningham et al. to use

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kinematics to control the arm because Miyake et al. teaches that this allows the controller to precisely control the position and orientation of the end effector while moving the arm.

Claims 15-17, 19-21, 23-25 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. in view of Brien, Maydan et al., Poduje et al, Ueyama et al., Miyake et al. and Kishi et al. (4,706,000). Cunningham et al. discloses a multiple linked robotic arm which may be modified according to the teachings of Brien to use linear base motions and according to the teachings of Maydan et al. to provide wafers horizontally and according to the teachings of Poduje et al. to provide wafer alignment when errors are detected and according to the teachings of Ueyama et al. to provide reversible tool end effectors and according to the teachings of Miyake et al. to provide kinematics controls as discussed above but none of these references disclose using two arms in a parallelogram arrangement. Kishi et al. discloses a parallelogram robot arm controller. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the controller of Cunningham et al. to use parallelogram links because these links are much stronger than single element links.

Claims 18, 22, 26 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. in view of Brien, Maydan et al., Poduje et al, Ueyama et al., Miyake et al., Kishi et al. and Genov et al. (5,064,340). Cunningham et al. discloses a multiple linked robotic arm which may be modified according to the teachings of Brien to use linear base motions and according to the teachings of Maydan et al. to provide wafers horizontally and according to the teachings of Poduje et al. to provide wafer alignment when errors are detected and according to the teachings of Ueyama et al. to provide reversible tool end effectors and according to the teachings of Miyake et al. to provide kinematics controls and according to Kishi et al. to provide parallelogram controllers as discussed above but none of these references disclose using belt and pulleys to transmit power to the desired joints. Genov et al. discloses a robotic arm positioner

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which uses belts and pulleys to transmit motion from the motor to the desired joints. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the controller of Cunningham et al. to use belts because Genov et al. teaches that this an efficient method of transmitting power to the desired link without locating a motor on the actual link itself.

Claims 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cunningham et al. in view of Brien, Maydan et al., Poduje et al., Ueyama et al., Miyake et al., Kishi et al., Genov et al. and Herzog (4,961,267). Cunningham et al. discloses a multiple linked robotic arm which may be modified according to the teachings of Brien to use linear base motions and according to the teachings of Maydan et al. to provide wafers horizontally and according to the teachings of Poduje et al. to provide wafer alignment when errors are detected and according to the teachings of Ueyama et al. to provide reversible tool end effectors and according to the teachings of Miyake et al. to provide kinematics controls and according to Kishi et al. to provide parallelogram controllers and according to the teachings of Genov et al. to provide belt and pulley drives as discussed above but none of these references disclose tilting of the shoulder upon which the robot arm sits. Herzog discloses a robotic arm controller in which the arm is tilted at the base. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the controller of Cunningham et al. to provide tilting at the base of the arm because Herzog teaches that this allows the arm to act compliantly when encountering an obstruction.

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Engelberger et al. discloses two robot arms that work together.

Genov et al. (5,007,784) discloses a link arm with a rotary tool.

Bartholet discloses a robot arm deflection correction device.

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Merlet discloses a positioning plate that changes the angle of the position plate.

Nishida et al. discloses an image processing system for a robot grabber.

Tateyama et al. discloses a waiting section between two arms.

Obigane discloses a wafer alignment sensor.

Nagamatsu et al. discloses a multiple robot conveyor working device.

Tabata et al. discloses a two link non-radial linear transfer device.

MacNeal, Jr. et al. discloses a robotic arm that feeds a conveyor.

4. A shortened statutory period for response to this action is set to expire 3 months from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Sircus whose telephone number is (703) 308-3119.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-1782.



Brian Sircus
Primary Examiner
June 9, 1997

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